



Anaergia

Redefining Recovery



Organics Digestion from MSW

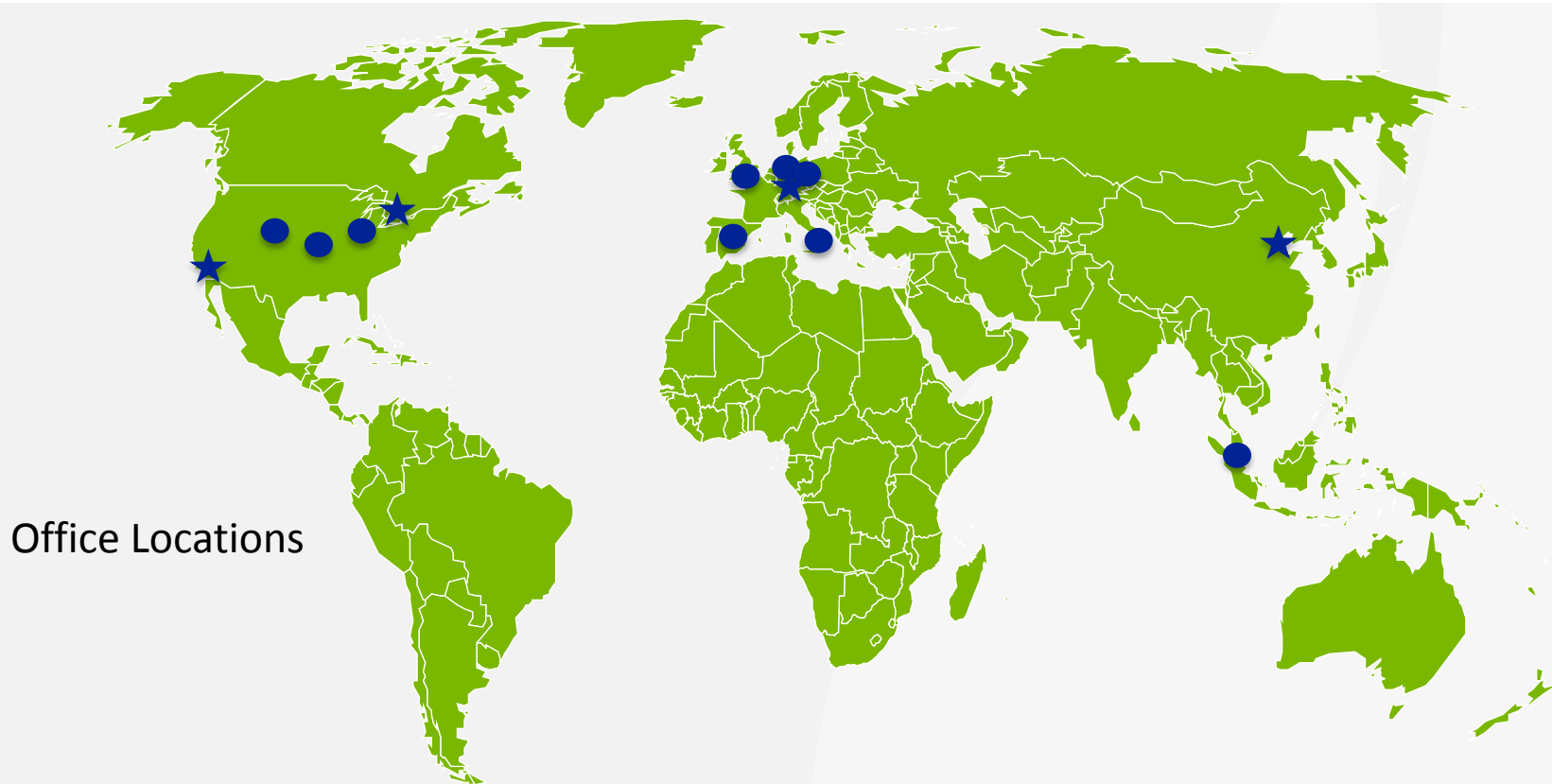
May 2014

Agenda

Section

1. Anaergia Overview
2. Anaergia Digester Reference Facilities
3. Organic Waste Recovery & Conversion to Energy
4. Anaerobic Digestion Technology
5. Anaheim Energy Food Waste to Energy Project

Anaergia's Global Footprint



1,600 Projects

360 MW

29 Patents

20 Years

C\$47.5 Million Growth Equity Commitment

- Macquarie Capital (“Macquarie Capital”)
- Tandem Expansion Fund (“Tandem”)
- Export Development Canada (“EDC”)
- Global H2O Investments (“Global H2O”)

<http://www.anaergia.com/news/anaergia-announces-47M-growth-equity-commitment#sthash.dRLGk6VJ.dpuf>

Sample of Anaergia Reference Facilities

> 1,600 references globally

Municipal Organic Waste



Glenfarg, Scotland

Substrate: Municipal Organic Waste

Capacity: 19,800 TPY

Energy Output: 800 kWe, 1.6 MW Total

Municipal & Industrial Organics Streams



Kloh, Germany

Substrate: Source Separated Organics, Grease, Potatoes, Swine Manure

Capacity: 18,000 TPY

Energy Output: 1.0 MWe, 2.4 MW Total

Under Construction: Municipal Organic Waste



Dagenham, UK

Substrate: Municipal Source Separated Organic Waste

Capacity: 49,000 TPY

Energy Output: 1.4 MWe, 2.8 MW Total

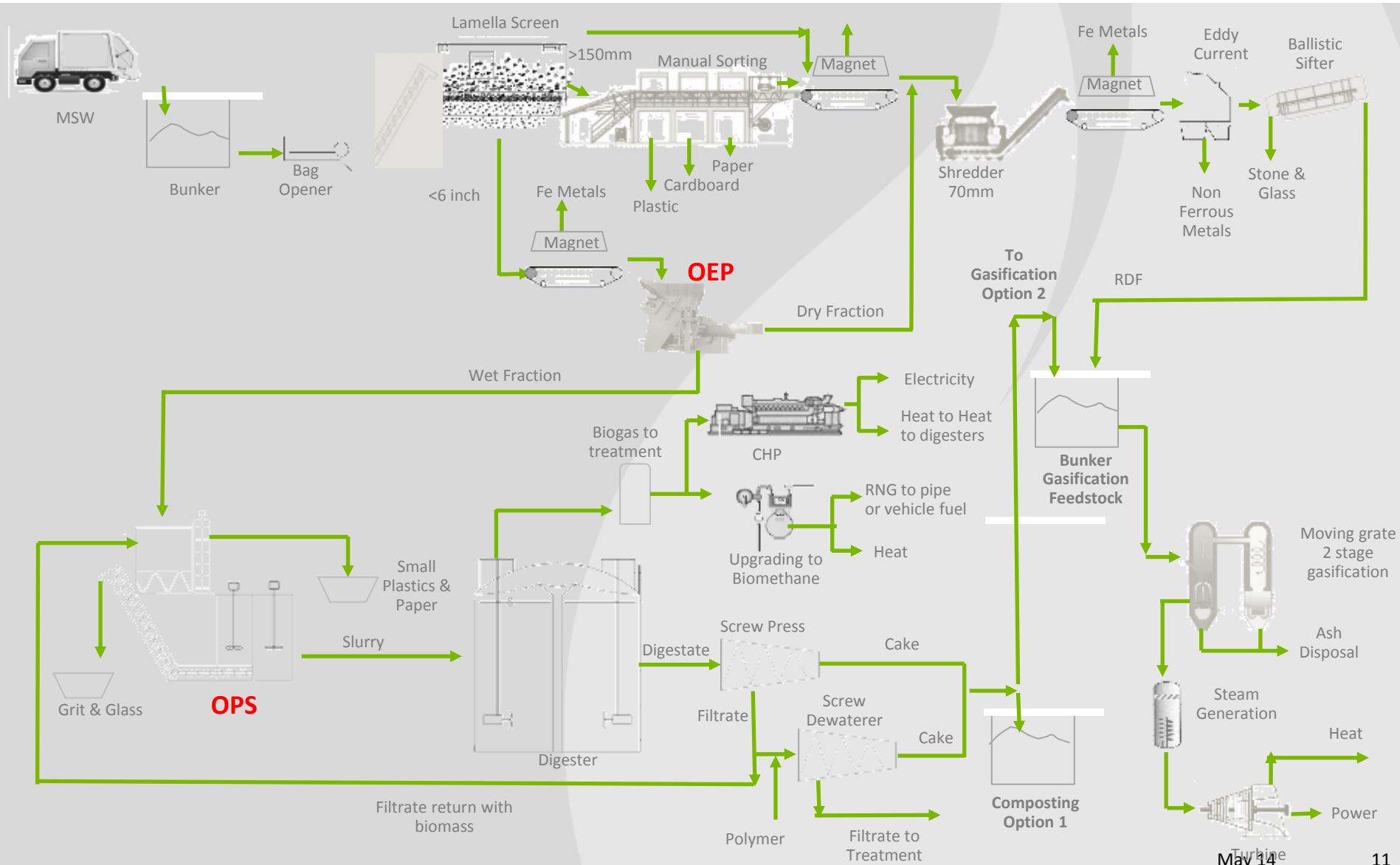
New Projects

- VVWRA – Omnivore Digester Retrofit and CHP
- Maui Integrated Waste Conversion Project – recycling, digestion of OFMSW, solid engineered fuel (>85% diversion)
- Anaheim Energy – OFMSW digestion – 4.5 MW PPA with Anaheim Public Utilities
- Bridgeport Digester – 2 digesters at WWTP (one sludge, and one food waste)
- Rialto Bioenergy Facility – regional biosolids/digestate drying – Phase II will add digestion of OFMSW

Organic Fraction Separation & Cleaning

Preprocessing Capabilities for Source
Separated Organics (SSO) and Mixed Solid
Waste (MSW) Organics Management

MSW – Process Flow Diagram



MSW – 30 to 65% wet fraction separation



SSO - typically > 80% wet fraction separation



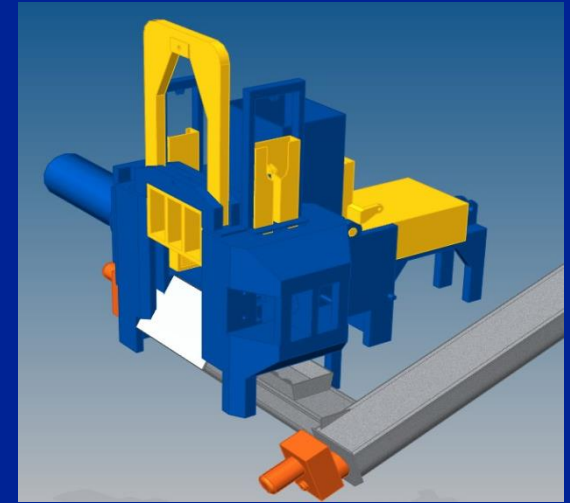
OEP Organics Recovery



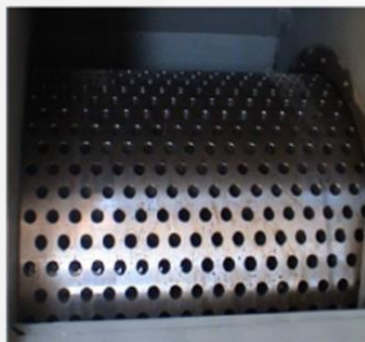
Kaiserslautern, Germany 3500H



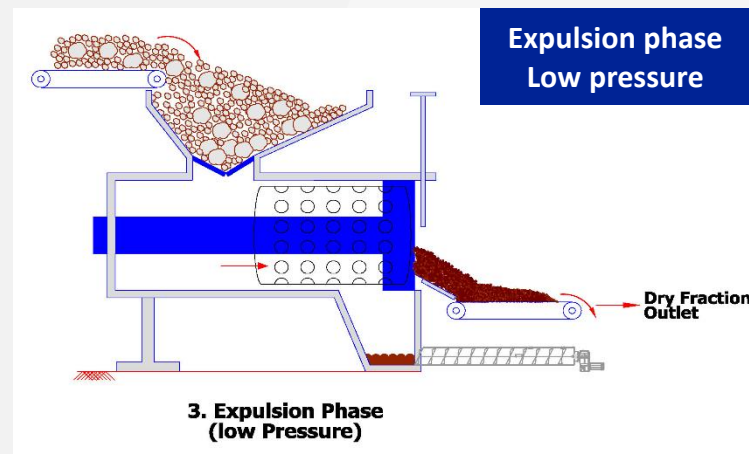
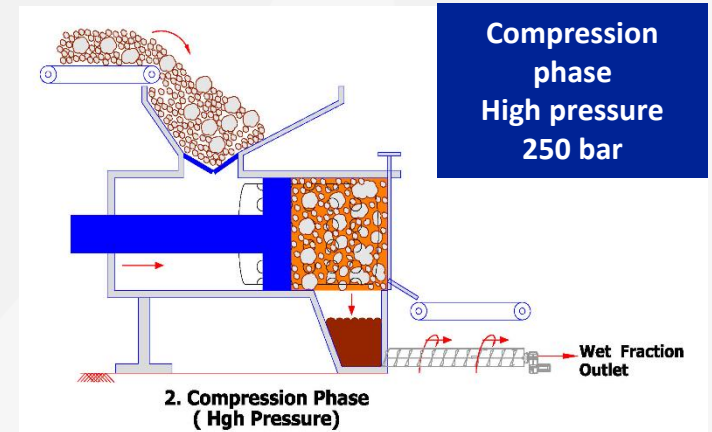
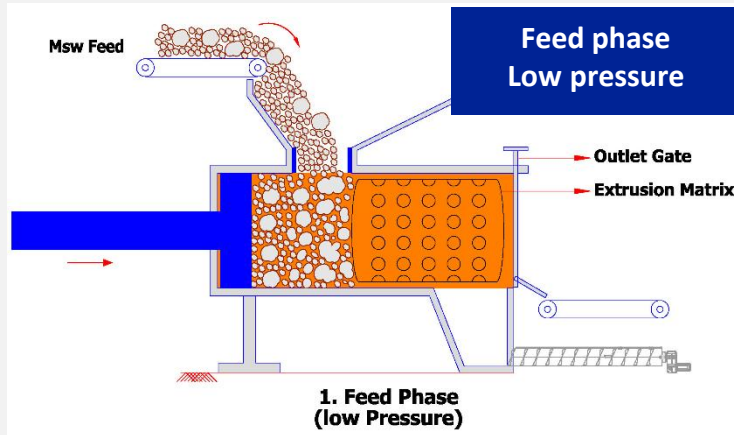
Ventspils, Latvia 2000H



In Construction OEP 500



OEP Organics Extrusion with Hydraulic Press



OREX Fractions

MSW, WCW or SSO



Hydraulic press

Organic fraction



Organic for digestion

- High specific biogas production
- Low fibre level
- Very low contaminant level
- 25 – 35 % DM
- 85 – 95 % VS

High calorific fraction



High calorific fraction

- High calorific value
- 60-70% DM
- 20–70% of input into the press depending on waste and preprocessing
- Suitable for thermal utilization with energy production with further processing

OREX Flexible To High Levels of Contamination



Wet Fraction from MSW or WCW
30-35% TS

Wet Fraction from SSO
20 – 25% TS

Digestate and Compost with Impurities

- Poor acceptability of compost, is still a waste and not a resource
- OEP eliminates this problem, reduces O&M cost in wet digestion, increases revenue through compost sales



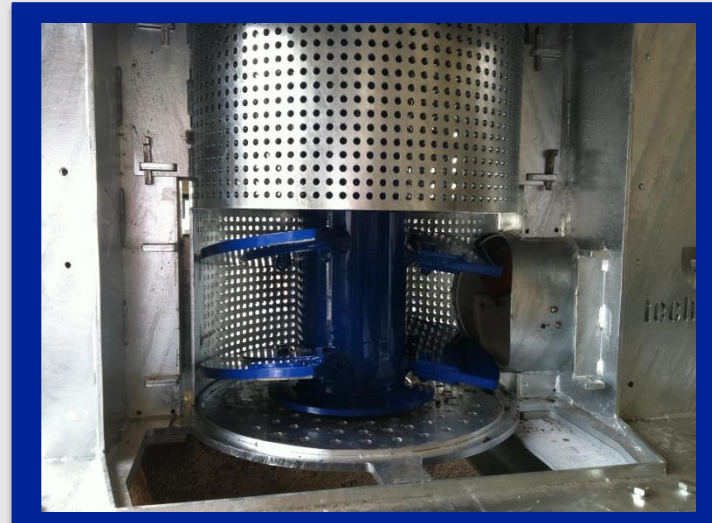
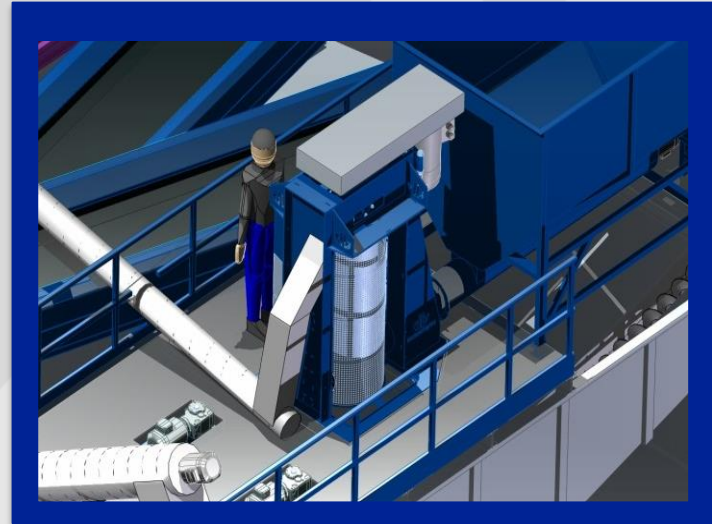
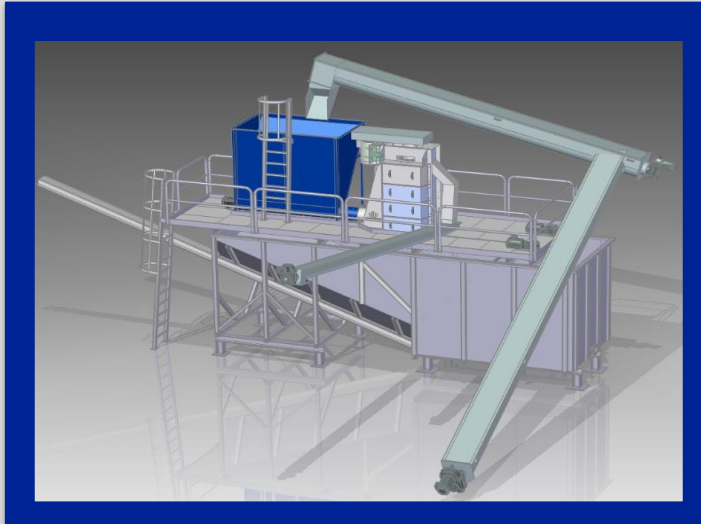
Digestate Hammer Mill and Wet AD



Compost Trommel and Wet AD

Organics Polishing System

(Improving Digestion and Digestate Quality)



Organics Polishing System (OPS) Cleaning Process

- Cyclone separator for small plastics and grit settling tank
- Optimal Separation Efficiency @ 12 to 15% TS feed

Contaminants		
	Glass, sand, stone	Plastic, textile, cardboard
Slurry Feed from VM Press	0.5 to 1% of TS	0.5 to 1% of TS
Slurry Output to Digesters	0.1% of TS	0.1 – 0.2% of TS

- Slurry collected in bottom pan and pumped to mixed storage tank
- Intermittent digester feed with PD pump

OEP References (partial)

Description of experience/ reference	Country	Capacity	Year
Sorting and treatment of mixed MSW	Kaiserslautern (Germany)	100,000 t/a	Since 2006, last changes 2012
Sorting and treatment of mixed MSW	Alessandria (Italy)	100,000 t/a	2007
Treatment of separately collected bio-waste	Castelceriolo (Italy)	25,000 t/a	2008
Treatment of separately collected bio-waste	Viareggio (Italy)	20,000 t/a	2008
Sorting and treatment of mixed MSW / industrial waste	Premier Waste (UK)	100,000 t/a	2008
Treatment of mixed MSW, RDF production	VamWijster (Netherland)	200,000 t/a	last changes 2009
Vagron (MBT) anaerobic digestion of organic fraction from MSW	Groningen (Netherland)	100,000 t/a	last changes 2009

WCW pre-treatment with limited recycling

- Dedicated commercial routes to restaurants, markets, commercial kitchens
- Single or multiple 30 ton/hr trains
- Ideally located in existing transfer stations
- Operate 6 days/week, 14 hr/day of run time
- Tip floor, manual presorting for rejects and large recyclables, bag opener, coarse screening optional to increase OEP throughput , ferrous metal recycling, dry fraction to landfill or solid engineered fuel
- Typical: to landfill 40%, recycled 6%, to AD 54%

Wet fraction is 50 to 60% of raw WCW as tipped depending on composition

- 30% TS, 87%VS/TS, BMP: 760 NL/kg VS biogas 62% CH₄
- Typical SoCal WCW power generation with wet fraction

Scenario	Electrical Production (kWe/h)
WCW (limited recycling)	
420 TPD (1 TRAIN)	3,800
840 TPD (2 TRAINS)	7,600
1,260 TPD (3 TRAINS)	11,400

Front End MSW Installation

Latvia 50,000 tpy capacity



Anaerobic Digestion Technologies

Converting Wet Fraction of Organics
Extrusion Press to Energy

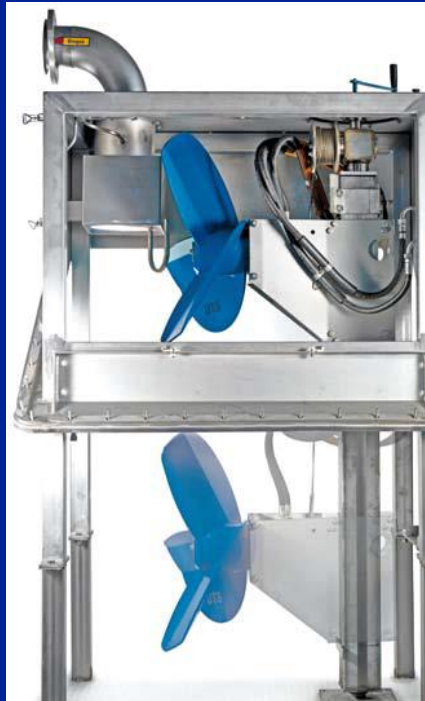
Hydraulic Mixers



Hydraulic Power Unit



Service Box



Digestate Two Stage Dewatering





Waste Testing

Food Waste Digester Projects

Mini OEP Testing in CA, Canada, and NYC

- Anaergia tested a small scale press that is used to determine organics recovery rates of a variety of waste streams and the digestion/contaminant characteristics of the organic fraction.
- Tested at 3 transfer stations in CA and recently at two sites in Canada and New York City (***New Yorkers call it the “Garlic Press”***)
- General results of the tests indicate that with material fed in the 2 to 10” range had the following results.
 - Single Family Residential – 30 to 35% separation to organic fraction
 - Multifamily Residential – 35 to 55% separation to organic fraction
 - Wet Commercial Waste – 50 to 70% separation to organic fraction
 - Source Separated Organics – 70 to 95% separation to organic fraction

Mini OEP Testing in CA - Continued

- Wet Organic Fraction Characteristics
 - Total Solids in the 25 to 35% range (sludge consistency)
 - VS/TS average of 89%; all samples greater than 80% - highly digestable
 - Plastic, grit, and metal contamination < 1% for greater than 2 mm
 - Organics Polishing System will further reduce these contaminants by up to 90%.
 - Metals concentration far below Class A biosolids

Test Press – Experience at Shoreway



OEP Test Press – Test Scale



Waste to be Sampled

Anaergia and Shoreway Sampled Waste Streams for two weeks in early October 2013

Waste Testing – September 2013

5 Ton Load



Tested Sample



Bulky Items



Dry Fraction



Organic Fraction



Digestate Management for LA/OC Projects

Rialto Bioenergy Facility

- Biosolids drying
- Digestate drying



Summary

- Anaergia offers a key technology for diverting organics from MSW – regardless of contamination
- Focused on complete lifecycle for organics diversion - digestion through digestate management
- All technologies in the process are operating at commercial scale – mitigating technology risk
- Potential for bolt on technologies being commercialized today – Pyrolysis of biosolids (Encina WWTP)